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Author(s): Meade, Roger Allen

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Mosler versus the Atom
How safe is a safe?

On June 24, 1957, a thirty-seven kiloton nuclear device, codenamed Priscilla, exploded over the Nevada Test Site's Frenchman dry lake.[1] Under the direction of the Federal Civil Defense Administration, a bank vault designed by the Mosler Safe Company of San Francisco, was placed at the projected 75 psi line "to evaluate the effectiveness of a reinforced-concrete vault and steel vault door in providing protection against the effects of a nuclear detonation."[2]

Priscilla

Testing structures against a nuclear blast began with the 1946 Crossroads test series, during which obsolete naval vessels, including the Japanese battleship Nagato. The Nagato did not survive. In 1955, the Apple-2 test subjected a wide array of civilian structures, including one and two–story houses, against its twenty-nine kiloton blast. The houses survived and can be seen from the Test Site's roads.

The bank vault "was a rectangular structure with an interior floor area of 102 sq. ft. "with a longitudinal axis" radial to Ground Zero. The 18-in. concrete walls and roof slab were lined with a ½-in. steel plate." To prevent the vault from being overturned, it "was anchored into a

[1] Priscilla was suspended from a balloon at an altitude of 700 feet..

[2] *Project 30.4: Response of Protective Vaults to Blast Loading*, Operation Plumbbob, ITR-1451, 1957, 9.

large mat foundation form 2 to 6 feet thick." "The door was a standard 10-in. thick vault door … modified to resist high intensity loads." Weighing 7.5 tons, the "door was mounted on a steel-plate box frame weighing 14 ½ tons." When closed, the vault was airtight.[3]

Blast damage to the exterior was largely confined to the side walls, whose concrete was stripped off and some very large chunks thrown more than eighty feet away. The steel reinforcing rods were bent and twisted. The vault door was essentially undamaged and was opened with minimal difficulty.[4] The condition of the interior is described below.

Bank Vault 2011

> The vault contents were only slightly disturbed by the blast. The sandbags against the front wall were shifted a few inches toward the rear of the vault. The movie camera, mounted on a tripod attached to the floor lining by three machine screws, was tilted upward approximately 10 degrees from its original position. The camera operated as planned, running 40 ft of film. The developed film was completely fogged. The two clinical type thermometers registered 88°F, and the 24-hr stylus American temperature recorder showed no variation in temperature from H-6 hr through H-18 hr, remaining constant at 88°F. The Leeds and Northrup thermocouple recorder ran 20 min, but the

[3] Ibid, 21.

[4] The blast did displace the door downward between 1/64 and 1/32 inches.

> bulb connection at the exterior front face of the vault was blown off and the temperature recorded in the chart dropped from 100°F to zero remaining there for the duration of its run. The lag in the mechanical equipment was too large to record the temperature in the time interval between the arrival of the thermal wave and the arrival of the shock.[5]

That the bank vault survived Priscilla was not a surprise. It was a very rugged structure placed at distance where the blast overpressure was all but a known quantity. As such, it mirrored the damage and results at Crossroads and to the civil defense experiments conducted during the Teapot-Apple 2 test in 1955. However, as Norris Bradbury told the National War College in 1949, there is no real defense against an atomic bomb.[6] The bank vault survived only because of its distance from ground zero.

[5] *Project 30.4,* 29.

[6] Norris Bradbury, *The Potentialities of the Atomic Bomb*, LA-UR-17-20929, 15.